OIPE
NOV 23 2005
PATENT & TRADEMARK OFFICE

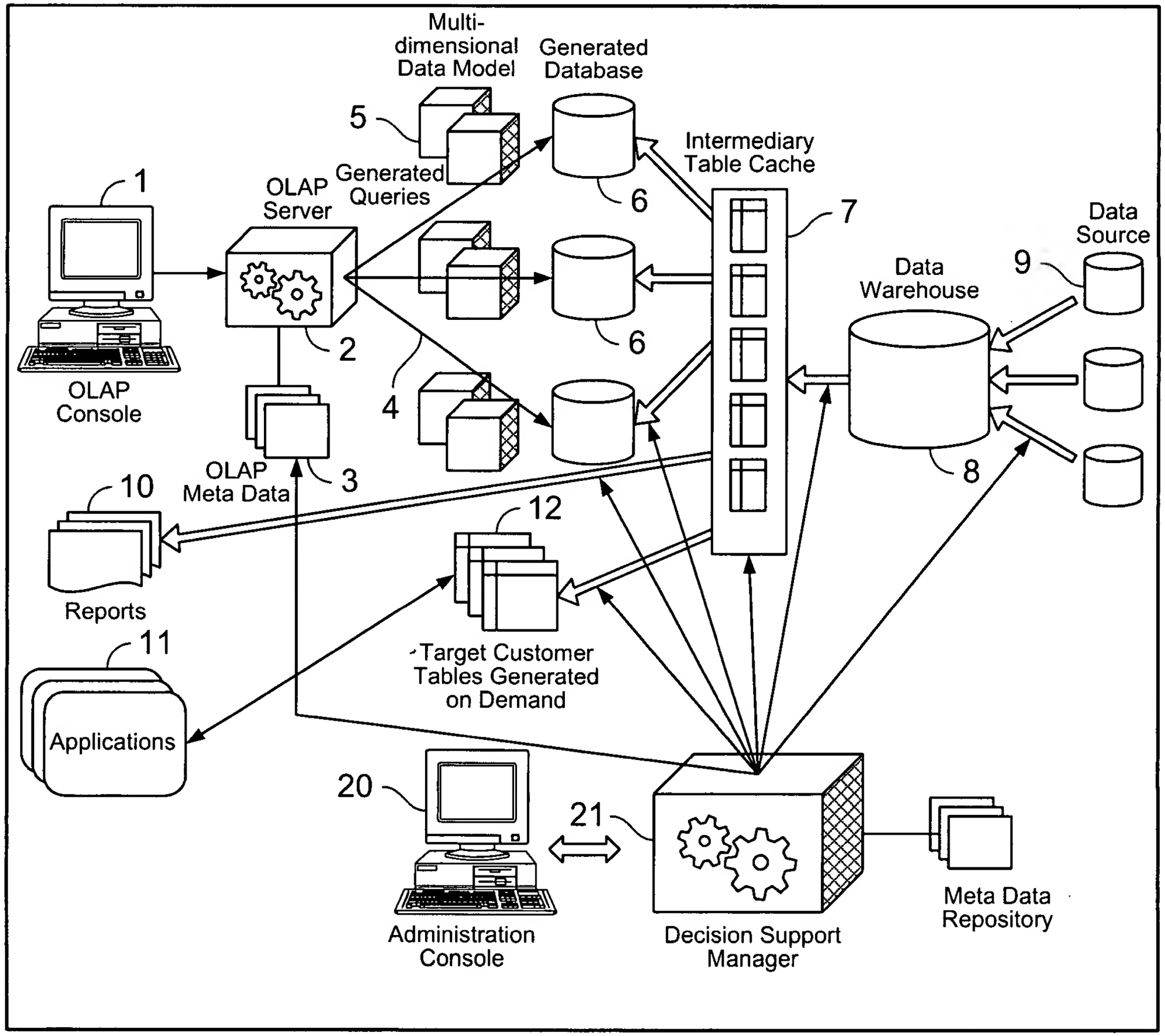


FIG. 1A

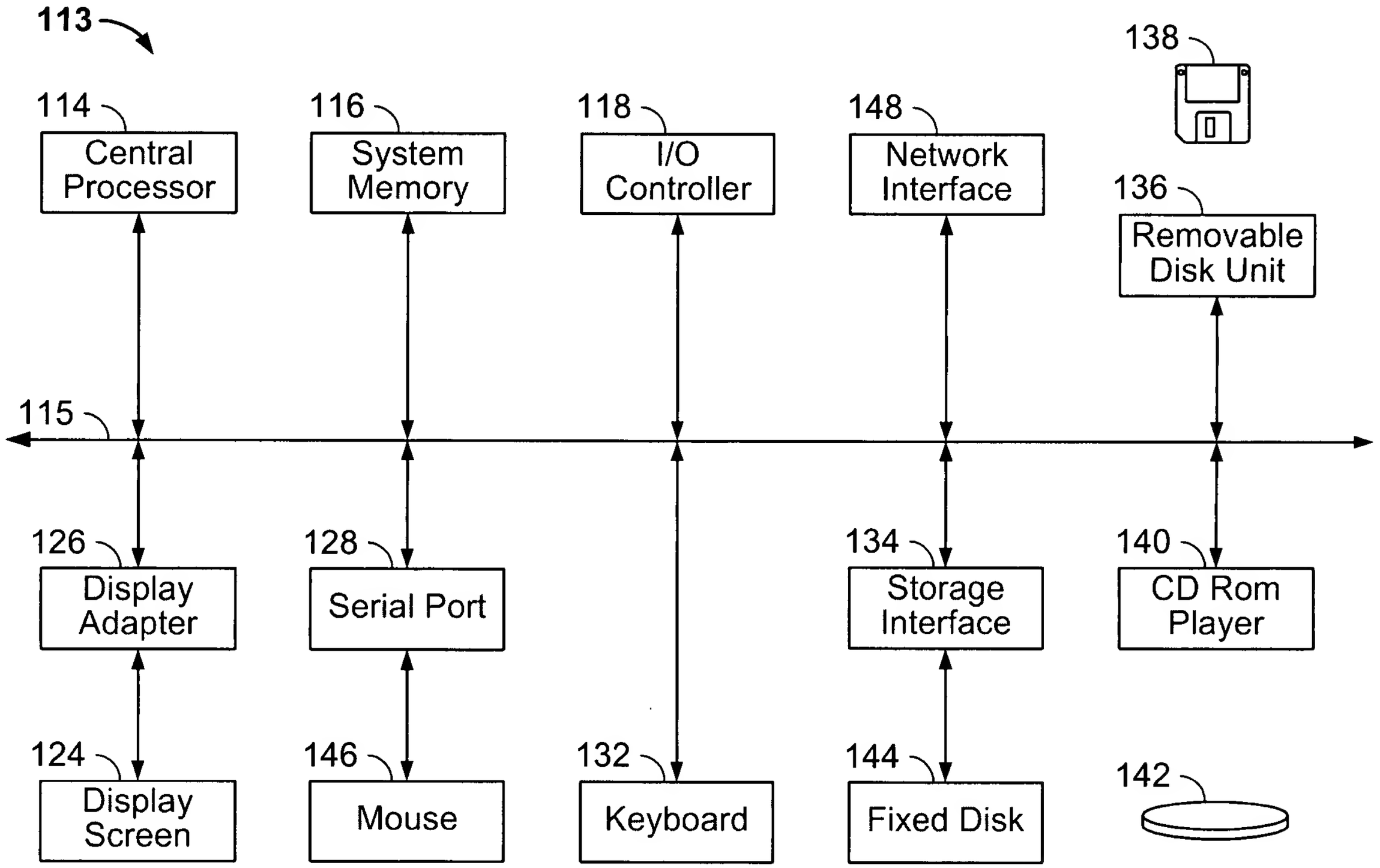

113
114
Central Processor
116
System Memory
118
I/O Controller
148
Network Interface
138
136
Removable Disk Unit
115
126
Display Adapter
128
Serial Port
134
Storage Interface
140
CD Rom Player
124
Display Screen
146
Mouse
132
Keyboard
144
Fixed Disk
142

FIG. 1B

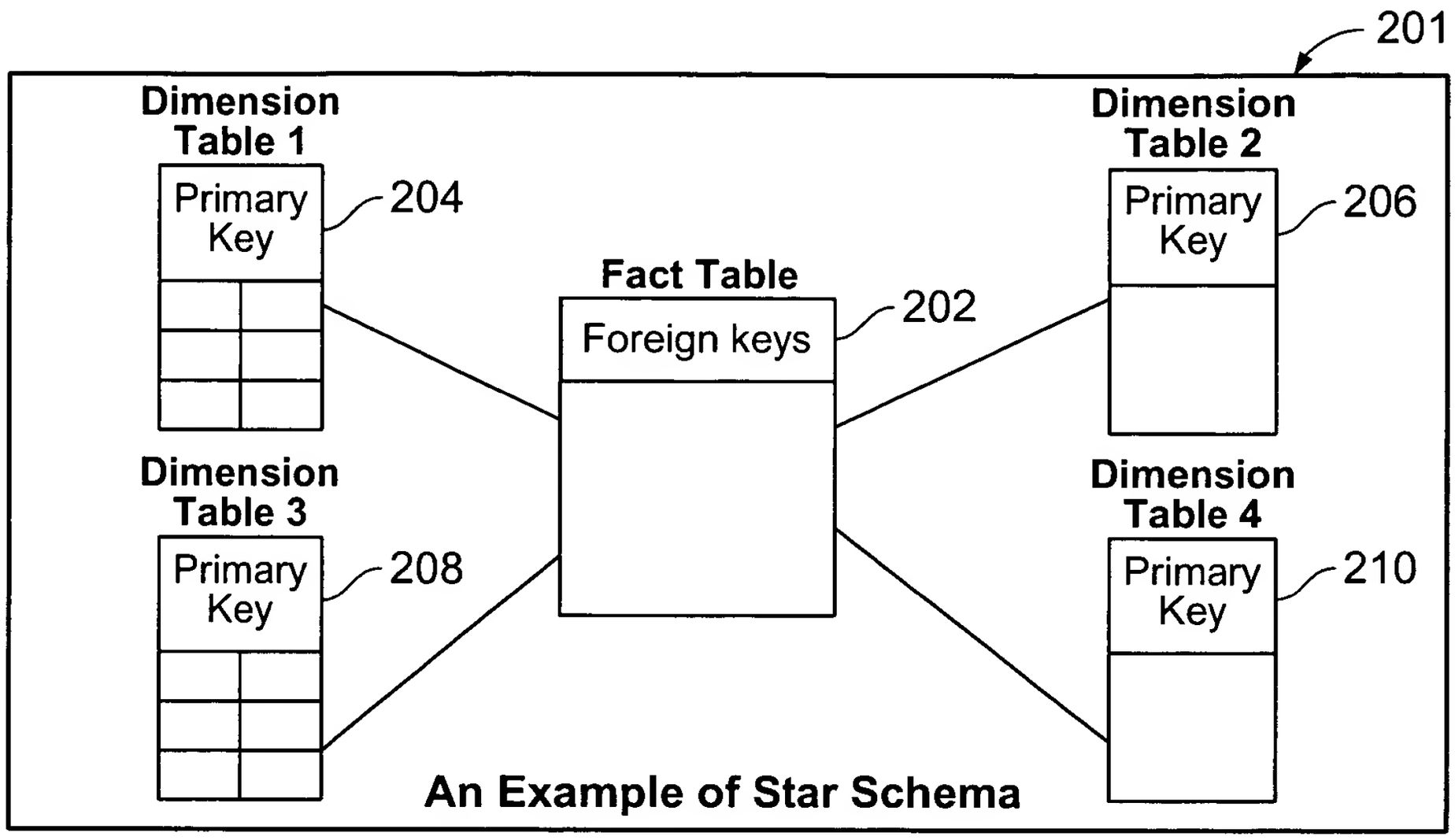

201
Dimension Table 1
Primary Key
204
Fact Table
Foreign keys
202
Dimension Table 2
Primary Key
206
Dimension Table 3
Primary Key
208
Dimension Table 4
Primary Key
210
An Example of Star Schema

FIG. 2A

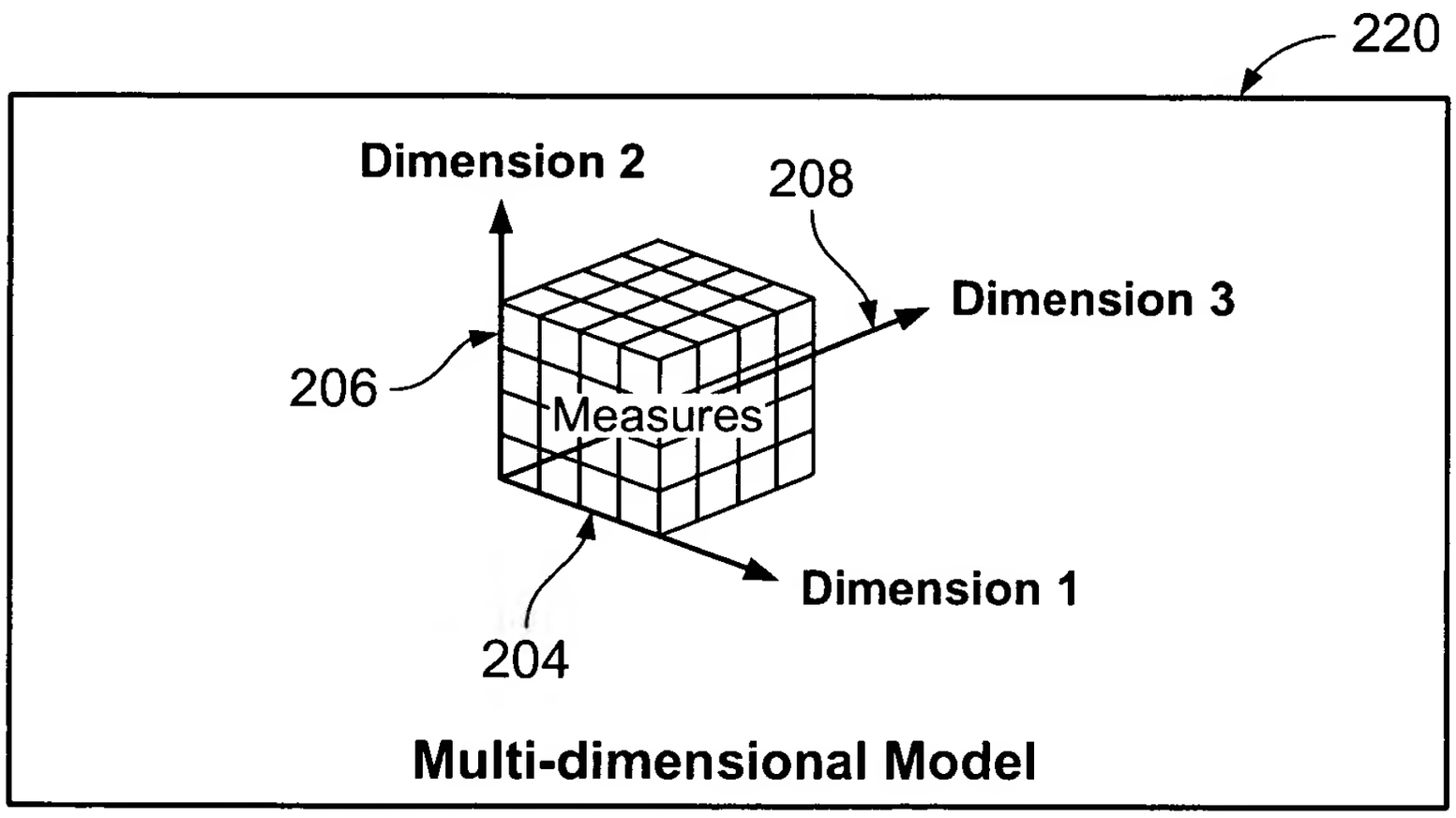

220
Dimension 2
208
Dimension 3
206
Measures
Dimension 1
204
Multi-dimensional Model

FIG. 2B

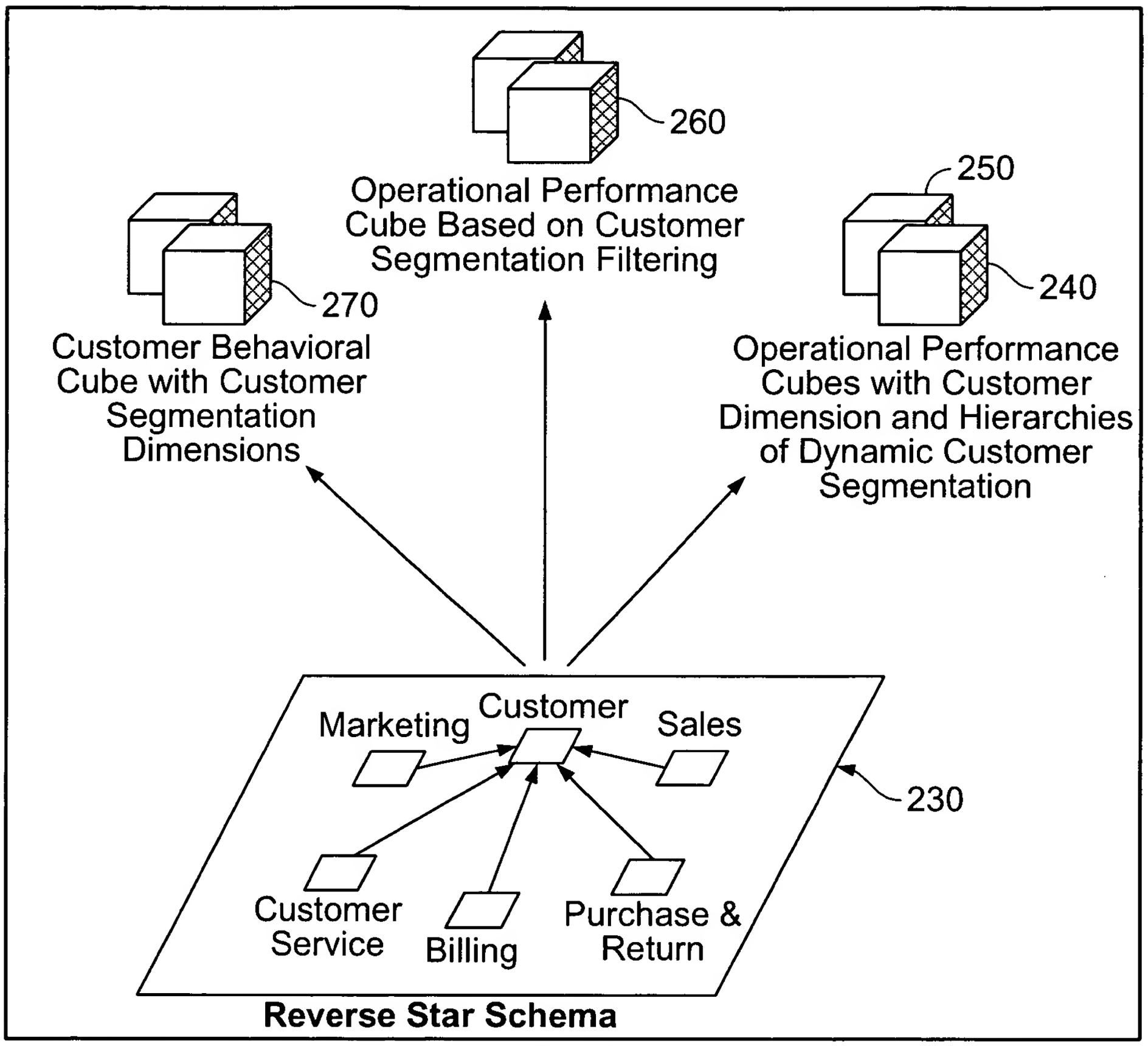

260
Operational Performance Cube Based on Customer Segmentation Filtering
250
240
270
Customer Behavioral Cube with Customer Segmentation Dimensions
Operational Performance Cubes with Customer Dimension and Hierarchies of Dynamic Customer Segmentation
Marketing
Customer
Sales
Customer Service
Billing
Purchase & Return
230
Reverse Star Schema

FIG. 2C

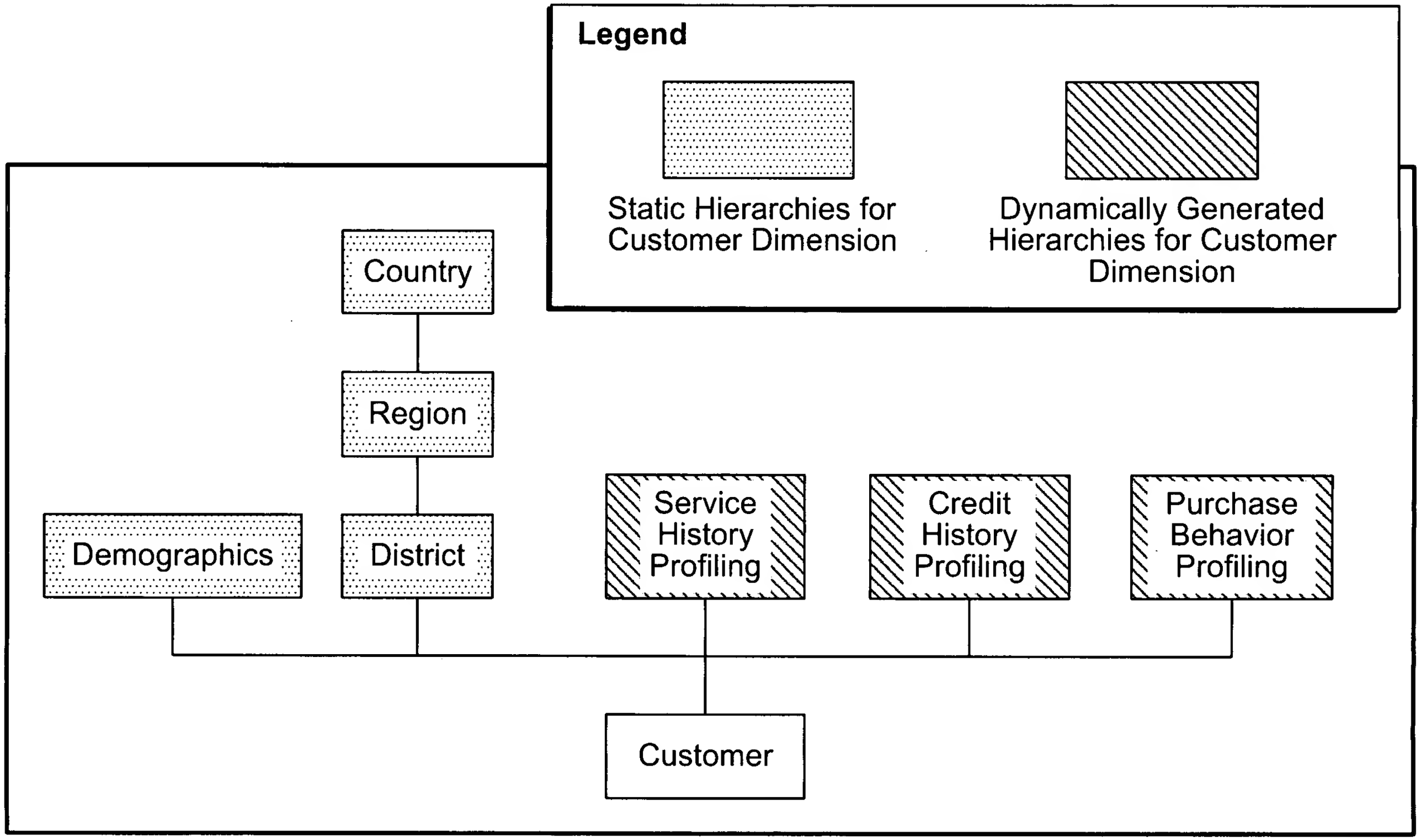

Legend
Static Hierarchies for Customer Dimension
Dynamically Generated Hierarchies for Customer Dimension
Country
Region
District
Demographics
Service History Profiling
Credit History Profiling
Purchase Behavior Profiling
Customer

FIG. 2D

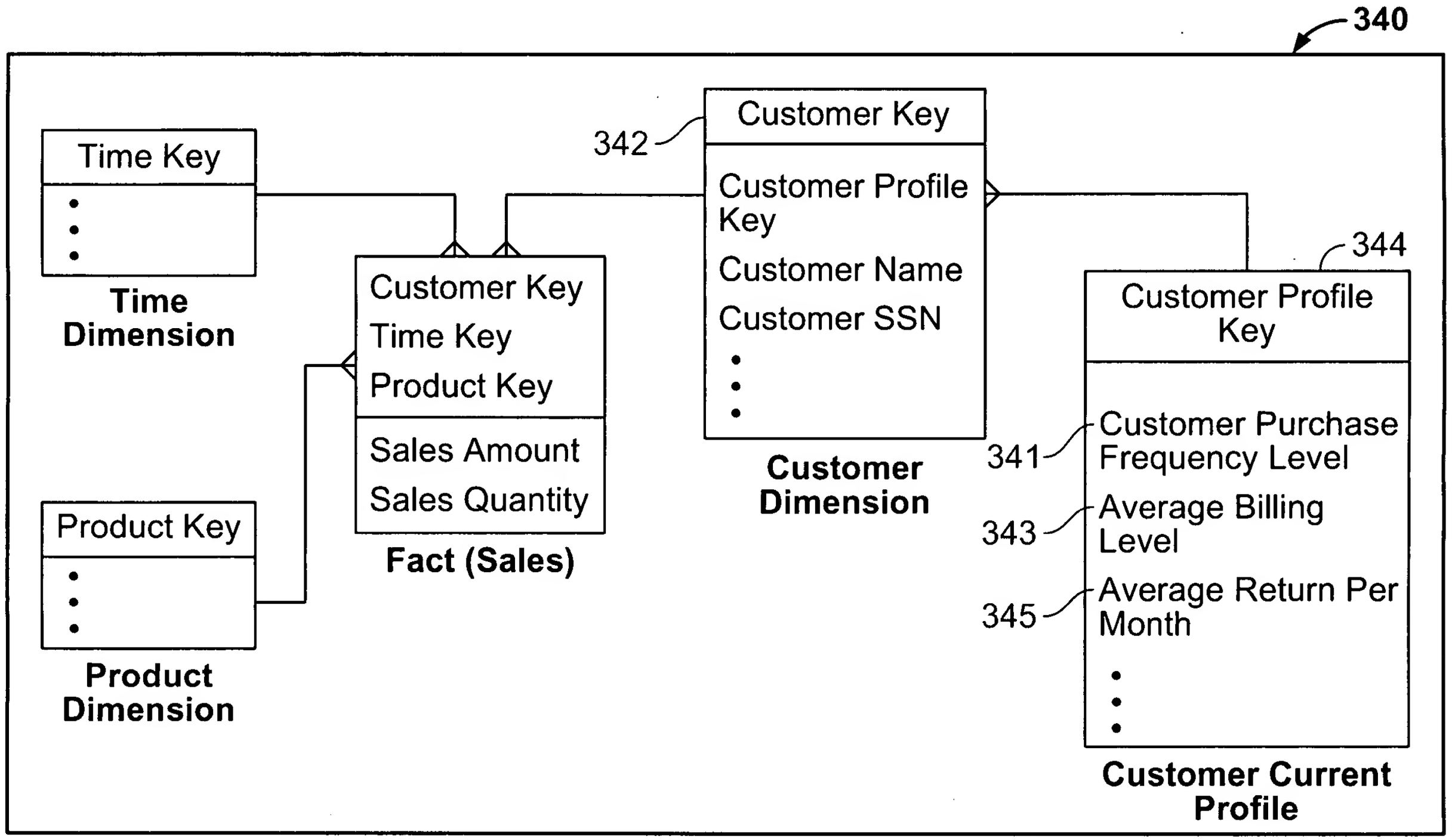

340
Time Key
Time Dimension
342
Customer Key
Customer Profile Key
Customer Name
Customer SSN
Customer Dimension
344
Customer Profile Key
341
Customer Purchase Frequency Level
343
Average Billing Level
345
Average Return Per Month
Customer Current Profile
Customer Key
Time Key
Product Key
Sales Amount
Sales Quantity
Fact (Sales)
Product Key
Product Dimension

FIG. 3A

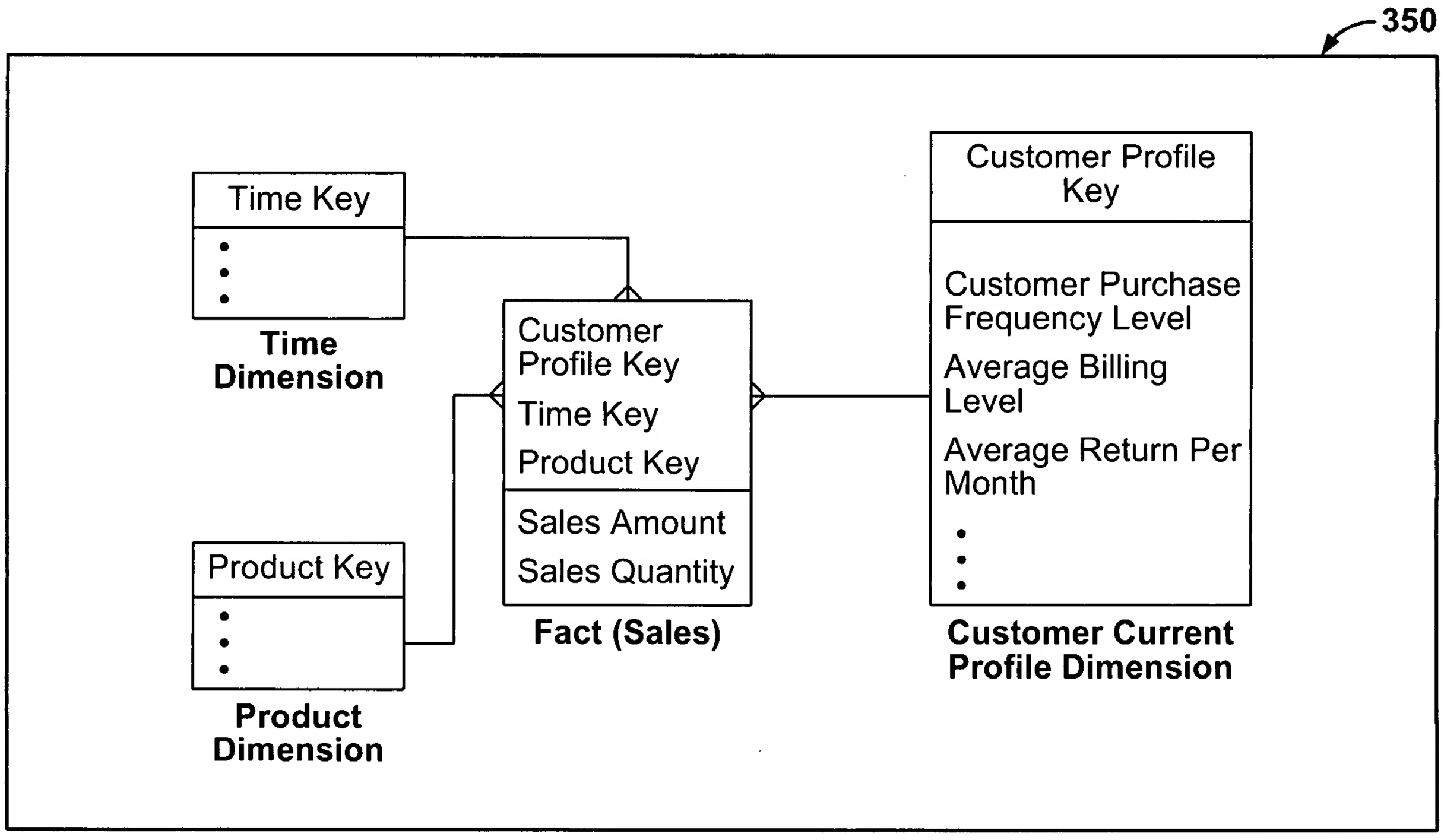

350
Time Key
Time Dimension
Customer Profile Key
Time Key
Product Key
Sales Amount
Sales Quantity
Fact (Sales)
Customer Profile Key
Customer Purchase Frequency Level
Average Billing Level
Average Return Per Month
Customer Current Profile Dimension
Product Key
Product Dimension

FIG. 3B

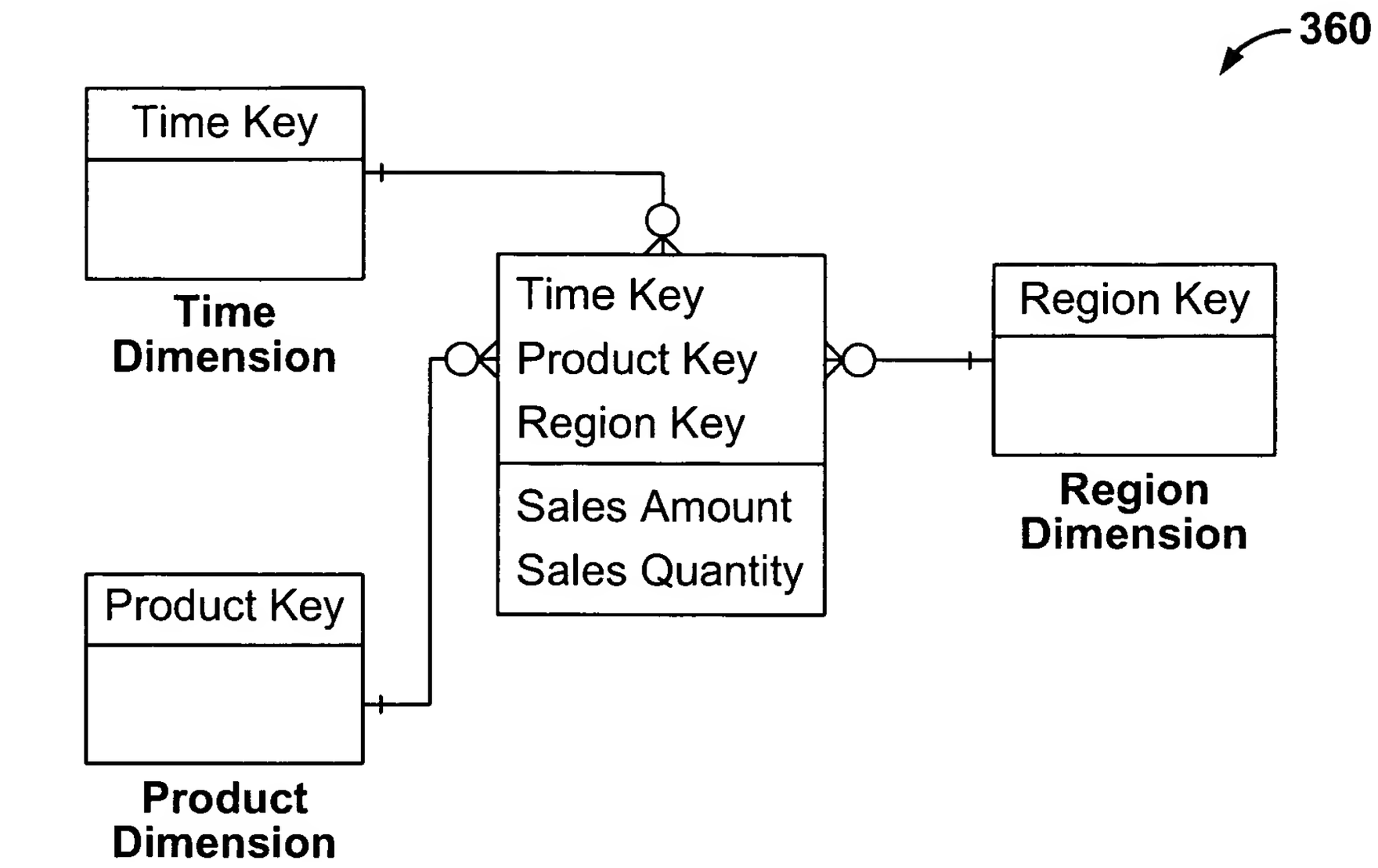

360
Time Key
Time Dimension
Time Key
Product Key
Region Key
Sales Amount
Sales Quantity
Region Key
Region Dimension
Product Key
Product Dimension

FIG. 3C

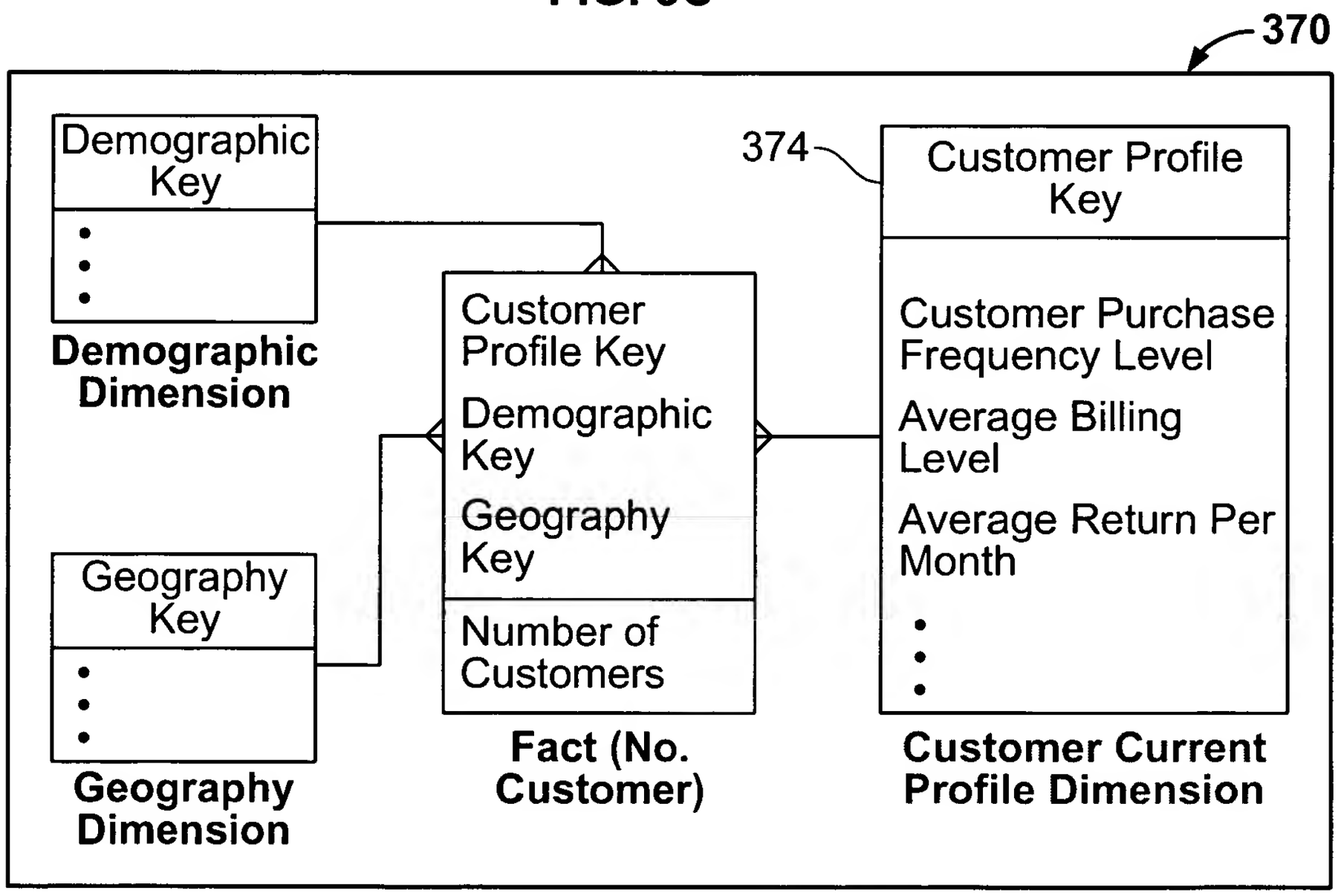

370
Demographic Key
Demographic Dimension
374
Customer Profile Key
Customer Purchase Frequency Level
Average Billing Level
Average Return Per Month
Customer Profile Key
Demographic Key
Geography Key
Number of Customers
Fact (No. Customer)
Geography Key
Geography Dimension
Customer Current Profile Dimension

FIG. 3D

Cube Report Examples

Ex1 : Description

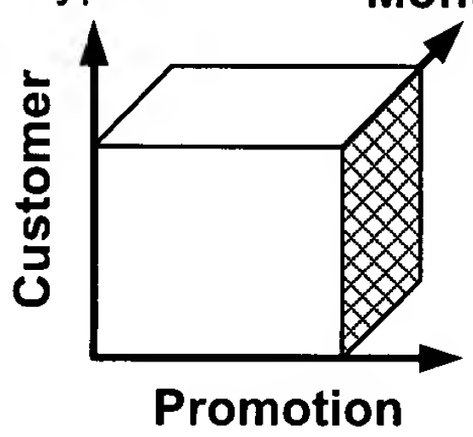
401

Dimensions: • Customer • Time • Promotion	Elements: • Customer Name • Month • Promotion
B-Measures: Avg. Spend Amount	Formula: sum(purch_amt) / count(trans)

440

Cube Type

Type1



Report Layout

405

Jan-99				
Name	**ID**	**Avg. Spend Amt.**		
		Promo 1	**Promo 2**	**Promo 3**
Miller				
Jackson				
Gellman				
Clarion				
Blackman				
Sbiera				
Subtotal Top 100				
Subtotal Rest				

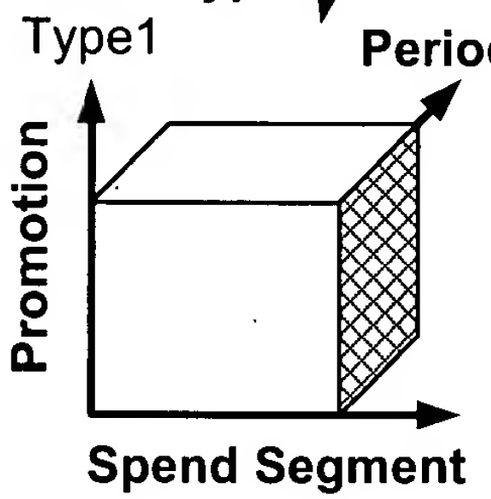
More Months

FIG. 4A

Ex2 : Description 411

Dimensions: • Customer • Time • Promotion	Elements: • Spend Segment • Period • Promotion
B-Measures: Avg. Spend Amount	Formula: sum(purch_amt) / count(trans)

Cube Type 450



Report Layout 415

Jan-99			
Promotion	**Avg. Spend Amt.**		
	Gold	**Silver**	**Copper**
Christmas			
Valentines			
Spring			
Summer			
Fall			
Thanksgiving			

More Months

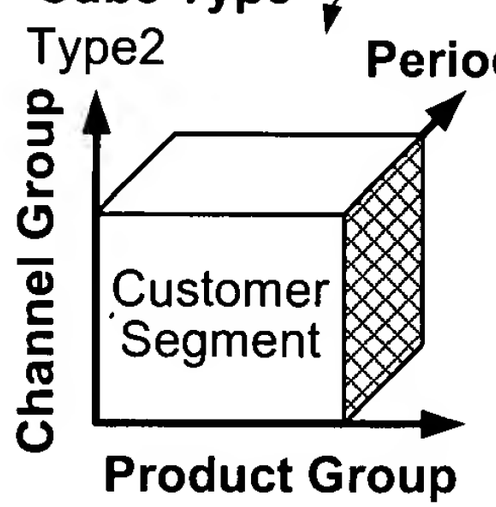
FIG. 4B

Ex3 : Description 421

Dimensions: • Channel • Product • Time	Elements: • Channel Group • Product Group • Period
B-Measures: Sales Contribution	Formula: sum(purch_amt) Filtered / sum(purch_amt)
Filter Dimension: Customer	Filter Elements: Customer Segment

460

Cube Type



Report Layout 425

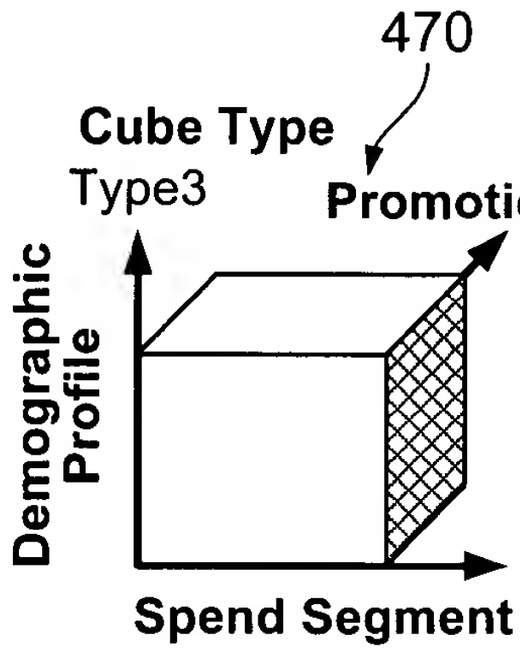
Jan-99			
Product Group	**Sales Contribution**		
	On-line	**Store**	**Catalog**
Books			
Magazines			
Cds			
Video Games			
Cassettes			
Gifts			
Data Set: Customer Segment = 1			

More Months

FIG. 4C

Ex4 : Description 431

Dimensions: • Customer • Promotion	Elements: • Spend Segment • Demographic Profile • Promotion
B-Measures: Count of Customer	Formula: count(cus_key)



Report Layout 435

Christmas Promotion

Age Group	Gender	Count of Customers		
		Gold	Silver	Copper
Young				
Young				
Adult				
Adult				
Senior				
Senior				

More Promotions

FIG. 4D

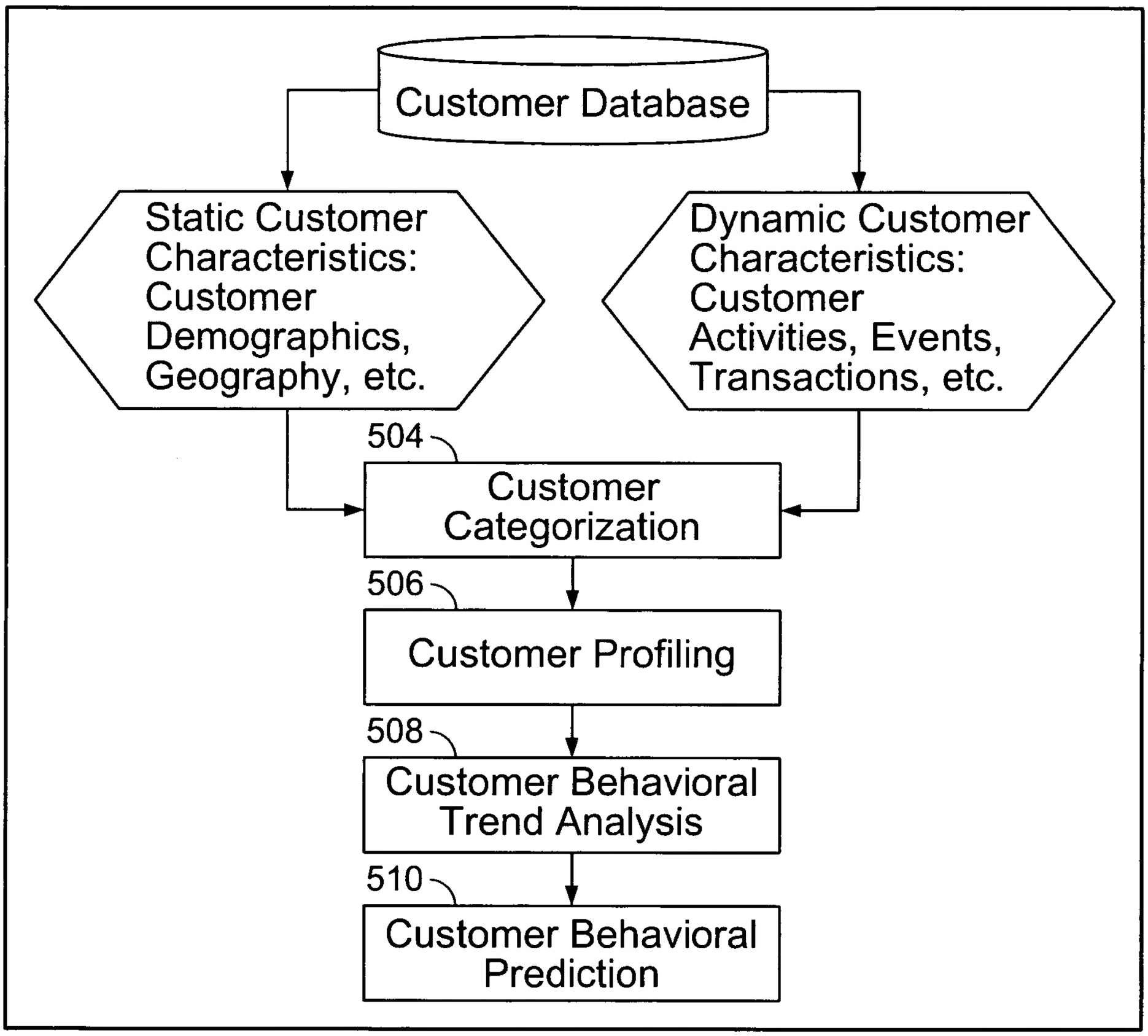

Customer Database
Static Customer Characteristics: Customer Demographics, Geography, etc.
Dynamic Customer Characteristics: Customer Activities, Events, Transactions, etc.
504
Customer Categorization
506
Customer Profiling
508
Customer Behavioral Trend Analysis
510
Customer Behavioral Prediction

FIG. 5A

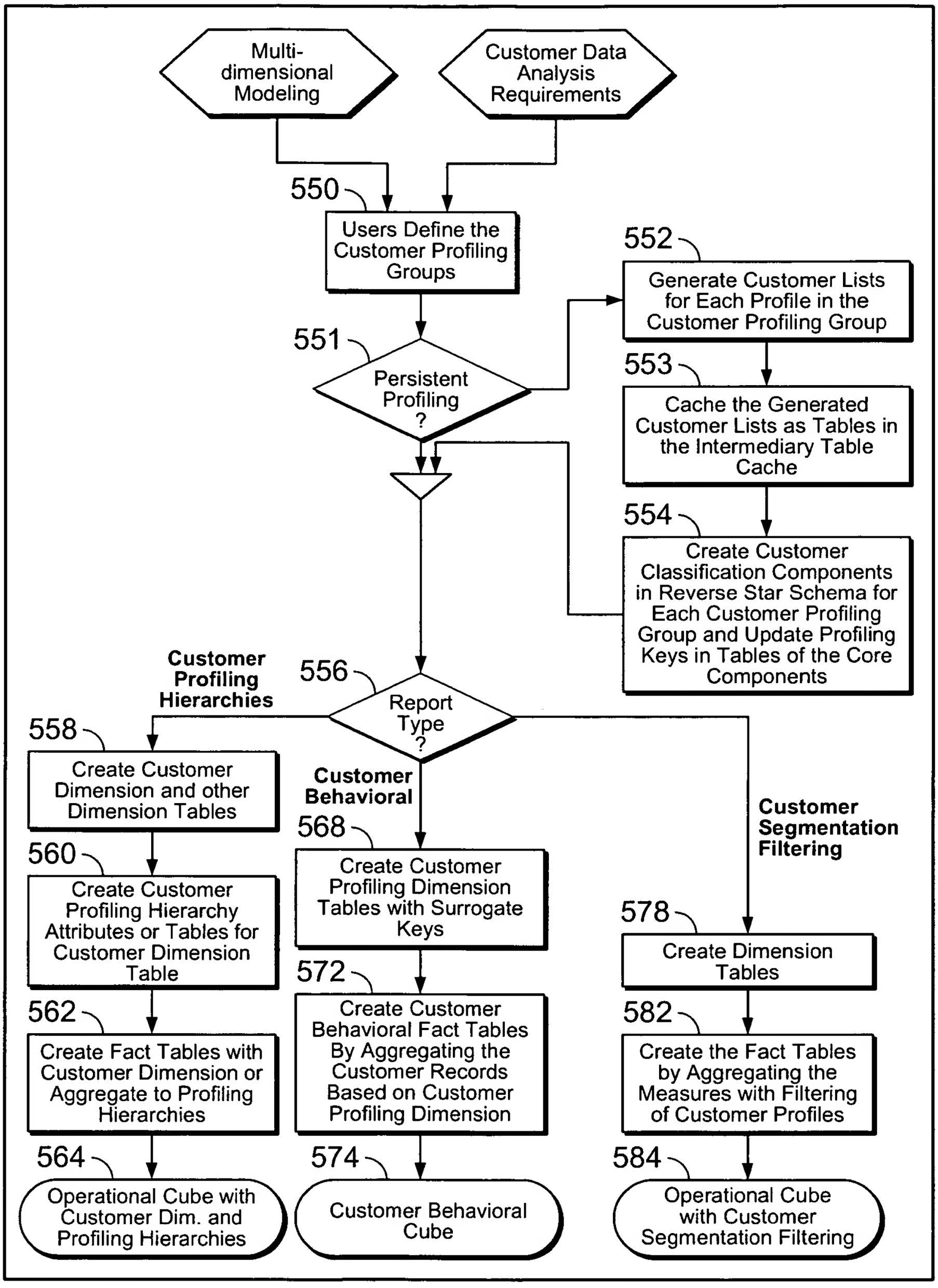

Multi-dimensional Modeling
Customer Data Analysis Requirements
550
Users Define the Customer Profiling Groups
551
Persistent Profiling ?
552
Generate Customer Lists for Each Profile in the Customer Profiling Group
553
Cache the Generated Customer Lists as Tables in the Intermediary Table Cache
554
Create Customer Classification Components in Reverse Star Schema for Each Customer Profiling Group and Update Profiling Keys in Tables of the Core Components
556
Report Type ?
Customer Profiling Hierarchies
Customer Behavioral
Customer Segmentation Filtering
558
Create Customer Dimension and other Dimension Tables
560
Create Customer Profiling Hierarchy Attributes or Tables for Customer Dimension Table
562
Create Fact Tables with Customer Dimension or Aggregate to Profiling Hierarchies
564
Operational Cube with Customer Dim. and Profiling Hierarchies
568
Create Customer Profiling Dimension Tables with Surrogate Keys
572
Create Customer Behavioral Fact Tables By Aggregating the Customer Records Based on Customer Profiling Dimension
574
Customer Behavioral Cube
578
Create Dimension Tables
582
Create the Fact Tables by Aggregating the Measures with Filtering of Customer Profiles
584
Operational Cube with Customer Segmentation Filtering

FIG. 5B

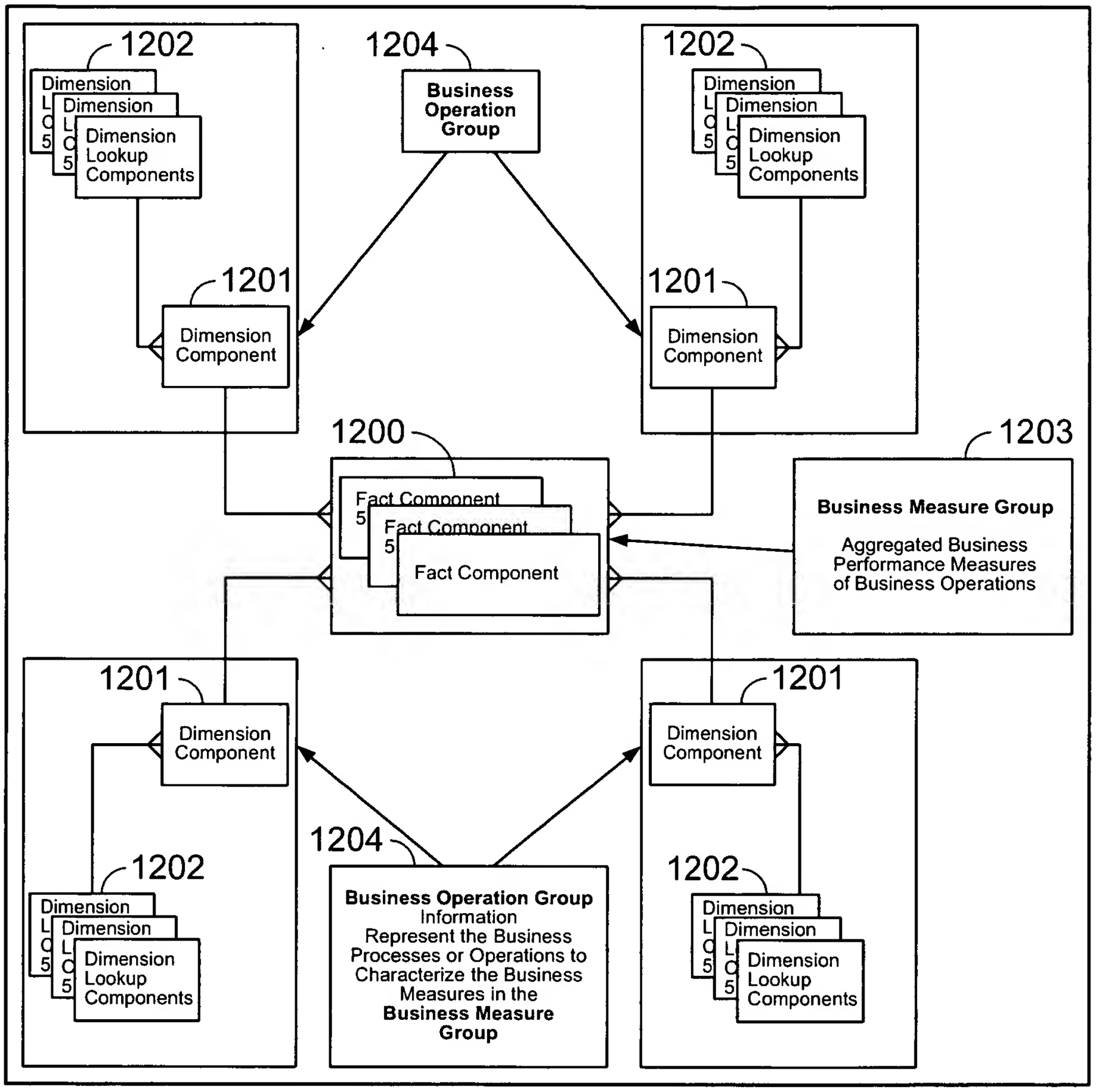

1202
Dimension
Dimension
Dimension Lookup Components
1201
Dimension Component
1204
Business Operation Group
1202
Dimension
Dimension
Dimension Lookup Components
1201
Dimension Component
1200
Fact Component 5
Fact Component 5
Fact Component
1203
Business Measure Group
Aggregated Business Performance Measures of Business Operations
1201
Dimension Component
1202
Dimension
Dimension
Dimension Lookup Components
1204
Business Operation Group
Information Represent the Business Processes or Operations to Characterize the Business Measures in the Business Measure Group
1201
Dimension Component
1202
Dimension
Dimension
Dimension Lookup Components

FIG. 6A

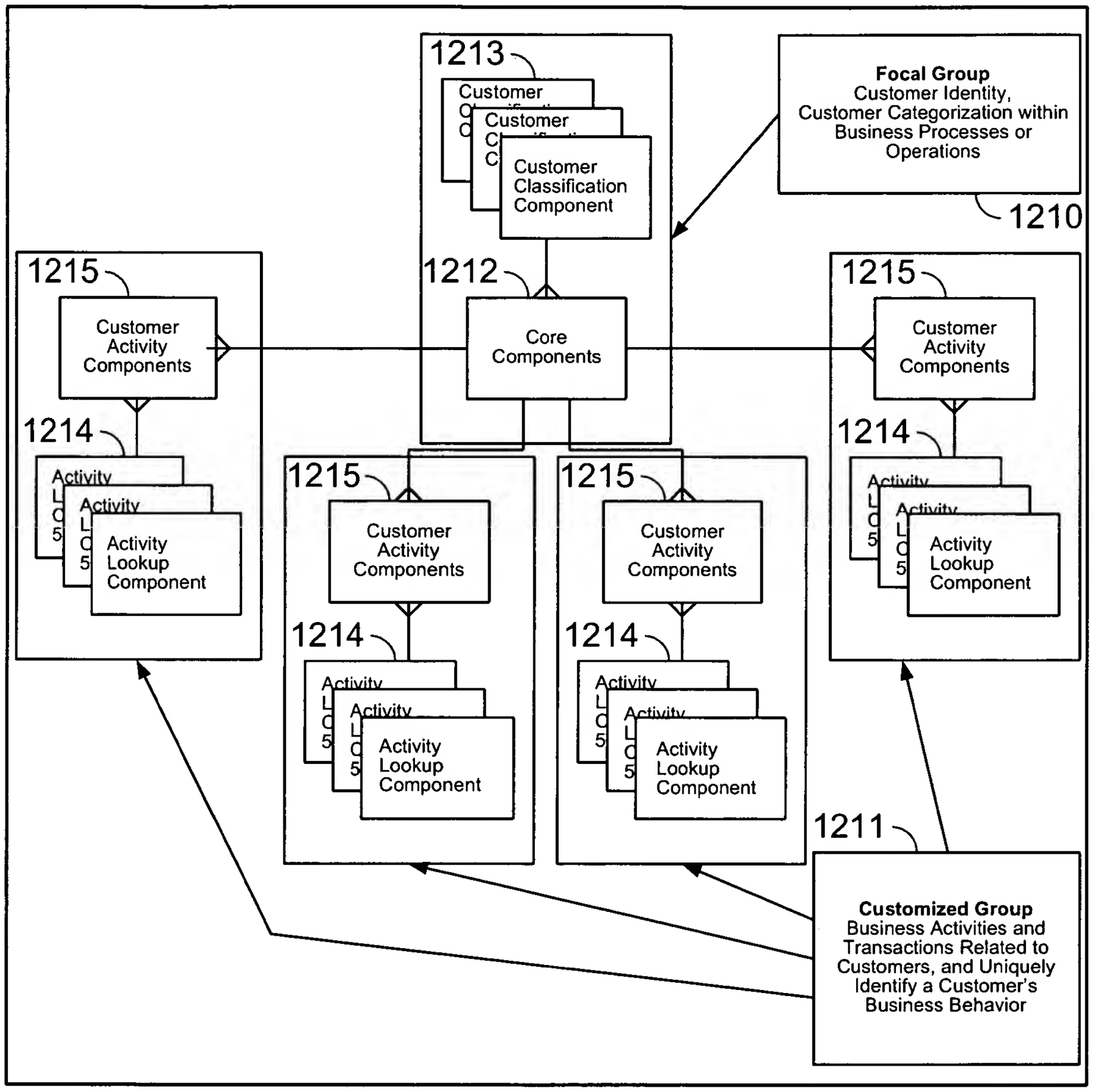

1213
Customer
Customer
Customer Classification Component
Focal Group
Customer Identity, Customer Categorization within Business Processes or Operations
1210
1215
Customer Activity Components
1212
Core Components
1214
Activity
Activity
Activity Lookup Component
1211
Customized Group
Business Activities and Transactions Related to Customers, and Uniquely Identify a Customer's Business Behavior

FIG. 6B

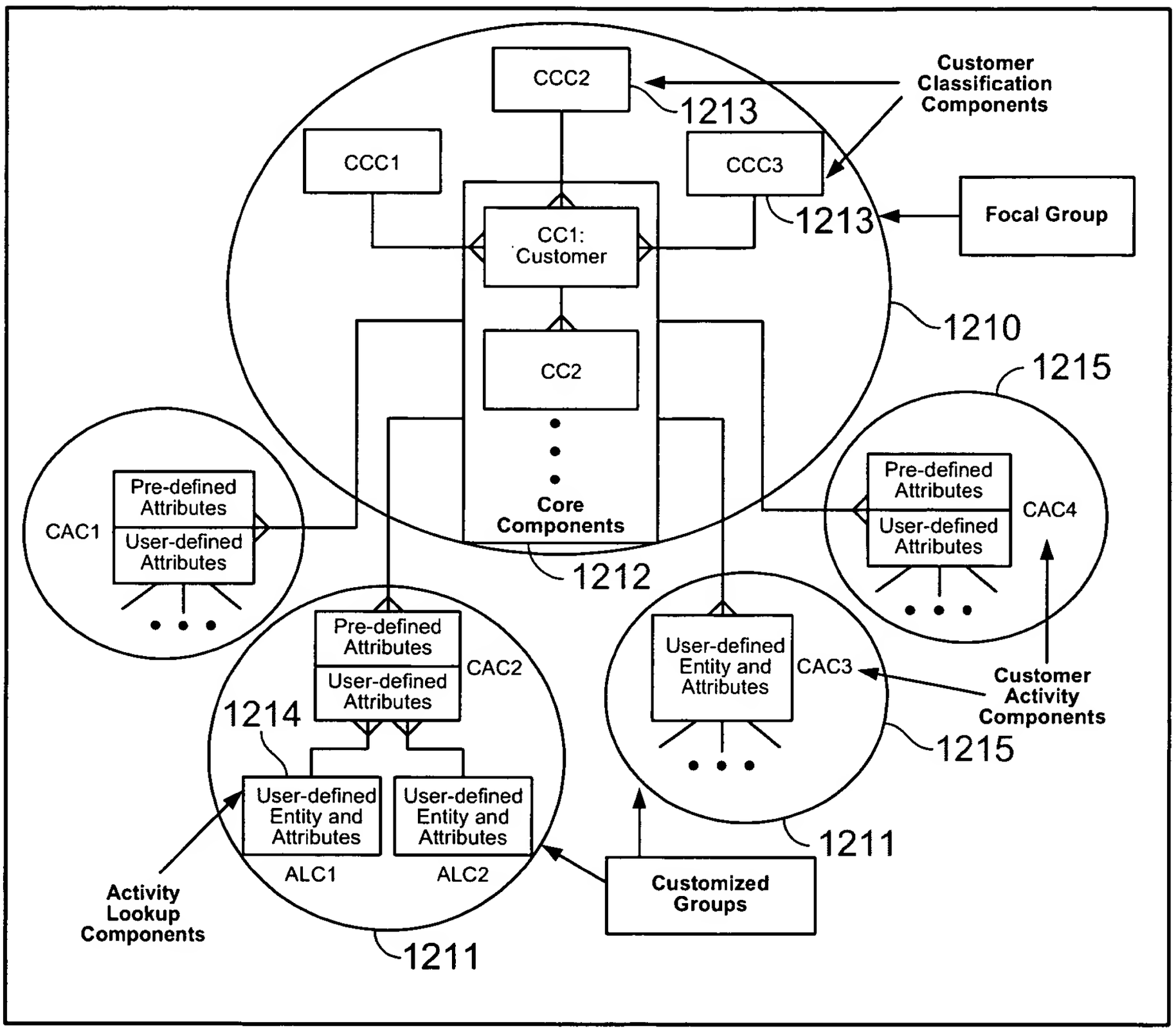

CCC2
1213
Customer Classification Components
CCC1
CCC3
1213
Focal Group
CC1: Customer
CC2
1210
1215
Pre-defined Attributes
User-defined Attributes
CAC1
Core Components
1212
Pre-defined Attributes
User-defined Attributes
CAC4
Pre-defined Attributes
User-defined Attributes
CAC2
1214
User-defined Entity and Attributes
CAC3
Customer Activity Components
1215
User-defined Entity and Attributes
User-defined Entity and Attributes
ALC1
ALC2
Activity Lookup Components
Customized Groups
1211
1211

FIG. 6C

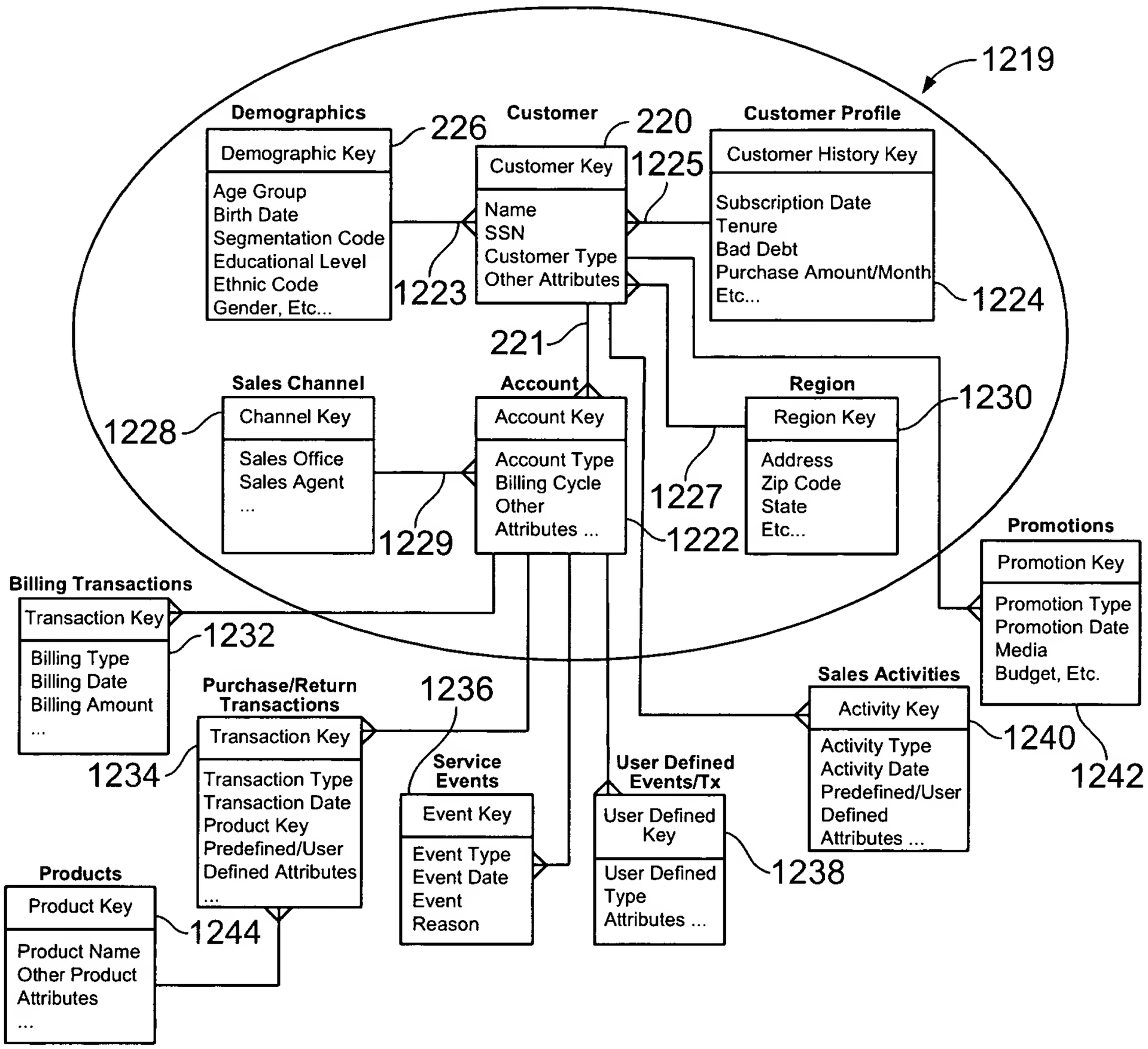

1219
Demographics
Demographic Key
Age Group
Birth Date
Segmentation Code
Educational Level
Ethnic Code
Gender, Etc...
226
Customer
Customer Key
Name
SSN
Customer Type
Other Attributes
220
1225
Customer Profile
Customer History Key
Subscription Date
Tenure
Bad Debt
Purchase Amount/Month
Etc...
1224
1223
221
Sales Channel
Channel Key
Sales Office
Sales Agent
...
1228
1229
Account
Account Key
Account Type
Billing Cycle
Other
Attributes ...
1222
Region
Region Key
Address
Zip Code
State
Etc...
1230
1227
Billing Transactions
Transaction Key
Billing Type
Billing Date
Billing Amount
...
1232
Purchase/Return Transactions
Transaction Key
Transaction Type
Transaction Date
Product Key
Predefined/User
Defined Attributes
...
1234
1236
Service Events
Event Key
Event Type
Event Date
Event
Reason
User Defined Events/Tx
User Defined Key
User Defined
Type
Attributes ...
1238
Sales Activities
Activity Key
Activity Type
Activity Date
Predefined/User
Defined
Attributes ...
1240
Promotions
Promotion Key
Promotion Type
Promotion Date
Media
Budget, Etc.
1242
Products
Product Key
Product Name
Other Product
Attributes
...
1244

FIG. 6D